13 Years Ago at JSC

Despite a hard-pressed repair attempt, fixing Syncom IV-3 was not in the cards

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There were times during STS 51-D, Commander Bo Bobko said, when trips to *Discovery*'s teleprinter reminded him of TV's Mr. Phelps, the silver-haired man who had weekly sessions with a tape recorder as leader of the Impossible Missions Force.

This mission was to have been a routine deployment flight, dropping off a Telesat satellite for Telesat Canada and a Syncom IV satellite for Hughes Communications.

When Syncom IV-3 slid out of *Discovery*'s payload bay April 13, however, the pre-mission plans went out with it. For reasons still not clearly understood, Syncom failed to activate according to a prescribed sequence of events.

The crew observed this lack of activity as the Syncom moved away at 1.5 feet per second. "Houston, we are watching the Syncom, and the omni antenna is still down," radioed Mission Specialist Rhea Seddon. As Syncom continued a slow roll through space, engineers on the ground tried to understand the failure mechanism.

NASA and Hughes went into a troubleshooting mode: Hughes to try and diagnose Syncom's problem, NASA to study methods by which the crew might attempt any fixes. The arming lever was among the most likely sources of the problem.

Equipment duplicating the arming lever and related mechanisms was flown in from the Hughes plant in California that afternoon, while at JSC, work began to build a scale replica of the satellite.

By Saturday afternoon, a series of meetings had begun that would continue for the next four days.

By Sunday, JSC was a hotbed of activity. Robert Crippen and Rick Hauck flew rendezvous runs in the Shuttle Mission Simulator; Jerry Ross and Woody Spring practiced EVA possibilities in the Weightless Environment Training Facility; Pinky Nelson and Bruce McCandless, fully suited in 1G, practiced pulling at the lever as a mock Syncom was twirled at 2 rpm from a rolling crane in Bldg. 9A. During the day, a wide assortment of flown astronauts and flight controllers passed in and out of the MOCR and the rooms in Bldg. 30 where ideas were discussed and evaluated, and then discarded or built upon.

By 6 p.m. Sunday, the Mission Management Team decided not to exercise any option which would involve placing an astronaut in any close proximity to Syncom—in other words, no astronauts at the end of *Discovery*'s robot arm, being maneuvered between a 210,000 pound orbiter and a 14,000 pound slowly spinning satellite. This did not, however, rule out an EVA entirely, nor at the time, did it rule out an astronaut effecting the repair.

The teams studying the problem began fashioning a tool which could be used to snag the activation lever. A call went out for controllers to look through their list of materials packed aboard *Discovery* for something long, such as aluminum tubing, which could be fashioned into a snare 12 or 15 feet long. Perhaps a crewman could wield the snare, or it could be attached to the robot arm. The EECOM assessment showed the handhold rails along the front of the Continuous Flow Electrophoresis System and tubing from the treadmill aboard for crew exercise as possibilities. Total tubing length: about 12 feet.

Planning continued Monday morning, and it was during this period that the "flyswatter" was born. The leading plan was to fashion a tool from materials in the cabin, attach the tool to the RMS during an EVA, then close on Syncom the following day. This was no small task. The raw data used to come up with a design went something like this: Something must snag Syncom's activation lever with 5 to 10 pounds of force and that something must be attached to the RMS; the satellite weighs two tons, and all of that mass is spinning at 2 rpm; the tool must snag the lever with enough force to move it, but must be weak enough to give way, so as not to damage the RMS. It then remained for the ground team to come up with materials on hand which could be assembled into a useable tool through instructions relayed either by voice, teleprinter, or both. The Great Flyswatter Design Effort was on.

The flyswatter's basic components consisted of a "swizzle stick", an aluminum rod used to throw hard to reach circuit breakers, the triangular-shaped suction tip from the orbiter's vacuum cleaner, pieces of plastic from Flight Data File covers, wire and lots of tape. By Monday, a second flyswatter design had been contributed. That design called for extracting stays from an interdeck sunshade, clipping one end to form a U-shaped brace, then notching the open end and attaching a slotted piece of plastic to it.

Tests then had to be performed on the homemade tools to determine how they would hold up in the vacuum and extreme temperatures of space. As those tests were under way, a third design called the lacrosse stick was developed as a backup to the first two. This used the same shade stay for its basic structure, but the business end was a loop of teflon coated wire, instead of plastic.

Instructions for flyswatter construction were teleprinted up to the crew. The Flight Activities Officer and their teams were put to the test as they constructed messages which would make sense of the intricate fabrication techniques. To the FAOs fell such tasks as drawing an arming lever diagram with X's and O's.

JSC Photo S85-30862

Orbit 1 team Flight Director John Cox explains the flyswatter to the news media at his daily press conference.

As each of these efforts led toward Tuesday's EVA, the crew spent the better part of Monday afternoon building flyswatters and lacrosse sticks. "This has really been an interesting day," Mission Specialist Jeff Hoffman said at one point. "We had toys this morning, and arts and crafts this afternoon."

As the EVA approached, attention began to shift from tests on the ground to the real thing in space. "The EVA plan is definitely free form," Lead Flight Director Randy Stone told reporters at his daily news conference. Later he said, "the only way we had a snowball's chance of pulling any of it off was taking it in a very relaxed manner. We had to do the EVA one step at a time, then go on to the rendezvous."

Thus on April 16, astronauts Hoffman and David Griggs cracked the hatch and stepped out into the payload bay, for the first contingency EVA in shuttle history, carrying with them three makeshift tools. The space walk went well. Now it was up to Bobko and Williams to fly Discovery back to Syncom, and up to Seddon to attempt a snag with the robot arm.

Early Wednesday morning, *Discovery* closed the distance with Syncom and came up from behind and beneath the satellite.

On the descending node of Orbit 79, just past the equator over the Atlantic Ocean, it was all up to Rhea Seddon. A six-minute window opened. Seddon moved the arm in slowly, and made the first snag attempt about 1 minute 45 seconds into the window. At 2 minutes 30 seconds she made contact with a flyswatter and it ripped away as expected. About 30 seconds later she tried again, catching the lever with the lacrosse stick. Almost four minutes into the window, she hit the lever a third time with the hard cone-shaped base of a flyswatter.

At six minutes into the window, CapCom Dave Hilmers radioed the crew, "*Discovery*, the window is closed. Perform separation maneuver."

Slowly, the ship moved off, leaving Syncom still spinning, albeit somewhat slower. The satellite had failed to activate, but not for want of extensive effort, one likened to the efforts to salvage Skylab, and before that, to save the Apollo 13 crew in far more difficult circumstances.

In the end, it was, in Bobko's words, "a demanding, challenging and extremely exciting spaceflight. It was JSC at it's finest."

Gilruth Center News

Hours: The Gilruth Center is open from 6:30 a.m.-10 p.m. Monday-Thursday, 6:30 a.m.-9 p.m. Friday, and 9 a.m.-2 p.m. Saturday.

Sign-up policy: All classes and athletic activities are on a first come, first served basis. Sign up in person at the Gilruth Center and show a yellow Gilruth or weight room badge. Classes tend to fill up two weeks in advance. Payment must be made in full, in exact change or by check, at the time of registration. No registration will be taken by telephone. For more information, call x30304.

Gilruth badges: Required for use of the Gilruth Center. Employees, spouses, eligible dependents, NASA retirees and spouses may apply for photo identification badges from 7:30 a.m.-9 p.m. Monday-Friday; and 9 a.m.-2 p.m. Saturdays. Cost is $10. Dependents must be between 16 and 23 years old.

Nutrition intervention program: Would you like to learn more about the role diet and nutrition play in your health? This six-week program includes lectures, a private consultation with the dietitian and blood analysis to chart your progress. Program is open to all employees, contractors and spouses. For more information call Tammie Shaw at x32980.

Defensive driving: One-day course is offered once a month at the Gilruth Center. Pre-registration required. Cost is $25. Call for next available class.

Stamp club: Meets every second and fourth Monday at 7 p.m. in Rm. 216.

Weight safety: Required course for employees wishing to use the Gilruth weight room. The next classes are scheduled for at 8 p.m. Apr. 9 and 23 (must be on time to receive credit for class). Pre-registration is required. Cost is $5. Annual weight room use fee is $90. Additional family members are $50.

Exercise: Low-impact class meets from 5:15-6:15 p.m. Mondays and Wednesdays. Cost is $24 for eight weeks.

Aikido: Introductory martial arts class meets from 5:15-6:15 p.m. Tuesday and Wednesday. New classes begin the first of each month. Instruction is by a fourth-degree black belt. Cost is $35 per month.

Step/bench aerobics: Low impact cardiovascular workout. Classes meet from 5:15-6:15 p.m. Monday, Tuesdays and Thursdays. Cost is $32 for eight weeks. Call Kristen Taragzewski, instructor x36891.

Yoga: Stretching Class. Low impact exercises designed for people of all ages and abilities in a Westernized format. Thursdays 5-6 p.m. $32 for eight weeks.

Ballroom dancing: Classes meet from 7-8:15 p.m. Thursdays for beginner advanced classes and from 8:15-9:30 p.m. for beginner-intermediate and intermediate students. Cost is $60 per couple.

Country and western dancing: Beginner class meets 7-8:30 p.m. Monday. Advanced class (must know basic steps to all dances) meets 8:30-10 p.m. Monday. Cost is $20 per couple.

Fitness program: Health Related Fitness Program includes a medical screening examination and a 12-week individually prescribed exercise program. For more information call Larry Wier at x30301.

Gilruth Home Page: Check out all activities at the Gilruth online at: http://www4.jsc.nasa.gov/ah/exceaa/Gilruth/Gilruth.htm

Ticket Window

Building 3 Exchange Store hours are 7 a.m.- 4 p.m. Monday - Friday.
Building 11 Exchange Store hours are 9 a.m. - 3 p.m. Monday - Friday.
For more information, please call x35350.
The following discount tickets are available at the Exchange Stores:

General Cinema Theaters	$ 5.50
Sony Loew's Theaters	$ 5.00
AMC Theaters	$ 4.75
Astroworld Early Bird Tickets (valid thru 5/31)	$18.50
Astroworld One Day Admission (valid at all Texas Six Flags Theme Parks)	$24.25
Astroworld Season Pass (valid at all Texas Six Flags Theme Parks and Water World)	$57.75
Moody Gardens (2 of 6 events)	$ 9.75
Sea World	adult $27.25 . . . child (3-11) $18.25
Schiltterbahn	adult $20.75 . . . child (3-11) $17.50
Space Center Houston	adult $10.25 . . . child (4-11) $ 7.00

Metro Tokens and value cards available.
Coming Soon:
Splashtown Water Park and Houston Comets Tickets.
Book Fair - May 5-7.

Roundup Deadlines

The Space News Roundup is published every other Friday. Story ideas should be submitted as far in advance as possible, but no later than two weeks prior to the date of publication.

The deadline for Dates & Data calendar items is three weeks prior to the date of publication. Stories and ideas should be submitted to Editor Kelly Humphries in Bldg. 2, Rm. 180, or via e-mail to kelly.o.humphries1@jsc.nada.gov.

Retirees should submit change of address notices to the distribution group at Mail Code BT552 or call Ignacia Ramirez at 281-483-6161.